

WHAT IS CLAIMED IS:

1. A pointing device including:

a sensor substrate having a flat board form;

a stick member vertically provided on the sensor substrate;

5 at least a pair of strain sensors arranged in symmetrical relation to each other with respect to the stick member; and a slit formed on the sensor substrate near the strain sensor, the slit inducing an increase in an amount of deformation generated in the sensor substrate during operation of the stick member.

10

2. The pointing device according to claim 1, wherein the sensor substrate is made of a flexible insulative material.

3. The pointing device according to claim 2, wherein the strain sensor is made of a resistance material which changes its resistance value with stress applied to the strain sensor.

15 4. The pointing device according to claim 3, wherein the resistance material is formed adhering onto the insulative material by a layer forming technique.

20

5. The pointing device according to claim 4, wherein the layer forming technique is selected from among a vacuum deposition method, a sputter method, and a vapor phase deposition method.

6. The pointing device according to claim 3, wherein the resistance material is a material mainly composed of carbon.

25

7. The pointing device according to claim 1 further including another pair of strain sensors arranged on the sensor substrate in a direction perpendicular to a line connecting the first pair of strain sensors while passing through a center of

the stick member,

wherein the strain sensors are arranged at 90° angular intervals around the stick member.

8. The pointing device according to claim 7, wherein two parallel slit portions are provided at both sides of each of the strain sensors, and the slit portions formed between the strain sensors adjacently arranged are connected to form the slit in an L-shape.

9. The pointing device according to claim 8, wherein four L-shaped slits are formed at 90° angular intervals around the stick member and the four L-shaped slits jointly form a cross-shaped intersecting area.

10 10. The pointing device according to claim 9 further including chip resistances capable of being trimmed, connected in series with the strain sensors correspondingly and arranged out of the intersecting area on the sensor substrate.

15 11. The pointing device according to claim 1, wherein the sensor substrate including:

20 a strain detecting substrate section on which the stick member and the strain sensors are disposed, this section being used for detecting an amount of strain of the sensor substrate by means of the strain sensors, the strain being caused by operation of the stick member; and

25 a signal processing substrate section for signal-processing the strain amount of the sensor substrate detected by the strain detecting substrate section;

wherein the strain detecting substrate section and the signal processing substrate section are connected through a

connecting substrate section which is narrower in width than the sensor substrate.

12. The pointing device according to claim 11, wherein the connecting substrate section is produced by formation of cut-out portions from both sides of the sensor substrate in its width direction toward a center thereof.

13. The pointing device according to claim 1 further including:

an engagement portion protruding from a lower end of the stick member;

an attachment hole formed in the sensor substrate, in which the engagement portion is inserted; and

a fixing member for fixing the engagement portion of the stick member inserted in the attachment hole, the fixing member being attached from a back surface of the sensor substrate;

wherein the stick member is vertically provided on the sensor substrate in an engagement relation thereto.

14. A keyboard provided with a plurality of keys arranged on a keyboard substrate and a pointing device mounted on a part of an operating face of the keyboard, the pointing device including:

a sensor substrate having a flat board form;

a stick member vertically provided on the sensor substrate;

at least a pair of strain sensors arranged in symmetrical relation to each other with respect to the stick member; and

a slit formed on the sensor substrate near the strain

sensor, the slit inducing an increase in an amount of deformation generated in the sensor substrate during operation of the stick member.

15. An electronic device provided with a keyboard including: a plurality of keys arranged on a keyboard substrate and a pointing device mounted on a part of an operating face of the keyboard; a controller for controlling various data input with the keys on the keyboard; and a display for displaying the data under control by the controller;

10 wherein the pointing device includes:

a sensor substrate having a flat board form;  
a stick member vertically provided on the sensor substrate;

15 at least a pair of strain sensors arranged in symmetrical relation to each other with respect to the stick member; and

20 a slit formed on the sensor substrate near the strain sensor, the slit inducing an increase in an amount of deformation generated in the sensor substrate during operation of the stick member.

16. The pointing device according to claim 3, wherein each of the strain sensors is formed with a plurality of windows in which the resistance material is absent, the windows being arranged in aligned relation to a line connecting the pair of the strain sensors while passing through a center of the stick member, and also each of the strain sensors is formed with a notch which is made by a trimming process of irradiating a laser beam to the strain sensor along the alignment direction of the

windows.

17. The pointing device according to claim 16, wherein the trimming process makes the notch so that an endpoint of the notch is received within the window.

5 18. The pointing device according to claim 16, wherein the resistance material is formed adhering onto the insulative material by a thick layer printing technique.

19. The pointing device according to claim 18, wherein the resistance material is a ruthenium material.

10 20. The pointing device according to claim 19, wherein the ruthenium material is ruthenium dioxide.

100 90 80 70 60 50 40 30 20 10 0